

# THE OHIO JOURNAL OF SCIENCE

VOL. LVI

SEPTEMBER, 1956

No. 5

## PROBLEMS OF PREPARATION FOR MEDICAL COLLEGE

A symposium on "Problems of Preparation for Medical College" presented as part of the program of the Medical Sciences Section at the annual meeting of The Ohio Academy of Science held at Wittenberg College, Springfield, Ohio, April 20, 1956.

*Chairman:* RALPH W. STACY.

*Participants:* T. K. MARKOPOULOS, President, Ohio Chapter, *Alpha Epsilon Delta*, Premedical National Honorary Fraternity; RICHARD L. MEILING, Associate Dean, College of Medicine, Ohio State University; RALPH W. STACY, Executive Vice-President, Medical Section, Ohio Academy of Science; JAY JACOBY, Professor of Anesthesiology, Ohio State University; R. A. HEFNER, Chairman, Department of Zoology, Miami University.

*Symposium Editor:* RALPH W. STACY.

## INTRODUCTION

RALPH W. STACY, Ph.D.

*Department of Physiology, College of Medicine, The Ohio State University, Columbus 10*

In the past several years, those of us who are concerned with the training of physicians have become increasingly aware of the existence of deficiencies in such training. There are large areas in which our doctors are not proficient and in which they should be adequately trained. So far as has been possible, the medical faculties have attempted to fill these gaps, but their ability to do so turns out to be limited because of the notoriously full curriculum of the medical student. No one is willing to delete classical and standard medical information in order to insert more modern information.

We will learn later that much of this missing information is material which many of us consider should have been learned in premedical training. However, there is an increasing tendency to delete technical material from the premedical curriculum and substitute material which is supposed to provide a fuller, more cultural life. It is postulated that the need for more rigorous technical training and the desire for more extensive cultural training are not completely compatible.

Thus, we are faced with a problem which can be solved only by mutual agreement between those of us who are directly concerned with medical education, and those of us from the arts and sciences colleges who are involved in training of students in premedical curricula. This is a national problem, but unfortunately there are no major national organizations encompassing both groups. The Ohio Academy of Science, on the other hand, presents a unique opportunity for intercourse of these two groups.

It is our hope that in this symposium, we will fracture the crust of our mutual problems and will make a beginning toward arriving at an understanding of what

is needed and how to proceed in administering to these needs. Let us hope that in this first session, we will at least get to know each other more intimately. We cannot hope to solve the problem in one session; such problems as these are solved by months and years of endeavor. However, we are given the chance to start, and in the way of men interested in advancement of activities of the human race, we will begin and continue.

We would like to express our appreciation to Dr. Ralph Dexter, the secretary of the society, for his cooperation in setting up the symposium, and for his suggestion that the symposium be published in its entirety in THE OHIO JOURNAL OF SCIENCE so that its message will reach more persons than can gather here.

## HIGHLIGHTS OF THE PREMEDICAL STUDENT'S PROBLEMS

TEDD K. MARKOPOULOS

*The Ohio State University, Columbus 10*

The problems of a premedical student may be divided into 9 parts as follows:

1. problem of a balanced education, 2. problem of the classroom, 3. problem of grades, 4. problem of study habits, 5. problem of admittance to medical school, 6. problem of adviser and advising, 7. problem of marriage, 8. problem of finance, and 9. problem of draft.

1. *The problem of a balanced education.* Many students feel they should obtain a liberal preprofessional education so that the student's attitude of mind would be reflected towards social values and the willingness to change attitudes with the growth and development of the country. It should stimulate curiosity and a desire to develop new ideas and to look into new fields. In brief, the student should be stimulated to think as well as learn.

However, what actually happens is that the undergraduate student takes his science requirements and instead of stopping there, as far as science courses are concerned, feels that he is obliged to major in a science in order to obtain admission to medical school.

This is probably due to many reasons, such as the poor advice from a freshman in medical school or from a well-meaning family physician, or the advice of an aggressive premedical adviser who insists that additional courses give the student advantages toward admittance, or to lighten the burden of the freshman medical courses. Therefore, most of the premedical students feel that these added courses in science do enhance their chances in selection to a medical school.

2. *The problem of the classroom.* Another problem to the student is the overcrowded classrooms. The teacher to student ratio is very low. In this situation it is easy for a minority of highly ambitious students to monopolize the classroom.

3. *The problem of grades.* Competition is so "keen" for grades that in the third and fourth year the students are so "hepped up" for grades that they work toward the grade and not the knowledge. As a result of this, the students do not benefit as much as they should from their courses.

4. *The problem of study habits.* The improper study habits and the improper academic approach toward a subject create other problems for the student since it is frequently the amount of work rather than the difficulty of the work which causes the trouble.

One of the major deficiencies of most premedical students is poor reading ability. This can be easily corrected early in the college career.

One way of correcting this is by the use of correct English in all courses. The present day trend towards the use of objective examination technics places little stress on this qualification. The ability of expression is a highly desirable talent in the medical profession, or any profession for that matter.

5. *Problem of admittance to medical school.* Still another problem is the undue

delay in notification of acceptance or rejection from a medical school. It produces an emotional strain which in many students interferes with their school work. Probably one way of solving this situation is to have a uniform date for filing applications and a uniform date in releasing the acceptances.

6. *Problem of adviser and advising.* The difficulty in seeing an adviser and the inadequate number of advisers available to the large number of students pose another problem.

Colleges should give more attention to their advisory program by giving the advisers lighter teaching loads so they can devote more time to students. They should provide travel funds to permit visits to professional schools, as well as participation in conferences and regional meetings pertaining to educational problems.

7. *The problem of marriage.* Many students are faced with the problem of whether or not they should marry before or after they enter medical school. Most believe the best solution to this is before entrance, whereby the wife (or husband, whatever the case may be) helps support the spouse through school; however, the bearing of a child to a couple becomes a financial worry and an emotional strain is placed on the student involved.

8. *The problem of finance.* This is a big problem prior to entrance in medical school; however, it is usually "ironed out" before the student enters professional school.

9. *The problem of the draft.* This is probably one of the least of worries for the student since he is exempt until his completion of medical school.

These have been most of the problems which affect premedical students. The solving of these will help in the development of the student as a citizen since his profession is practiced in a social and economic environment.

## PROBLEMS OF PREPARATION FOR MEDICAL COLLEGE THE VIEWPOINT OF A MEDICAL COLLEGE ADMINISTRATOR

RICHARD L. MEILING, M.D.

*College of Medicine, The Ohio State University, Columbus 10*

The subject of our symposium today; namely, "Problems of Preparation for Medical College," has received in recent years increasing attention from prospective medical students, their parents, high school and college science faculty members, medical college entrance committees, medical college faculty members, practicing physicians, and the lay public (including the educators, press, social workers, and patients). The interest of this large and diversified group is in geometric proportion to the public and professional reputations and interests of the personalities, the institutions, and the organizations involved. I full well recognize the controversial aspects of any remarks I may now make and hasten to assure you they are my personal opinions and not necessarily the policy of our University.

As a medical educator and administrator, but still, first and foremost, a physician dedicated to the "art of the practice of medicine," I find but one single logical approach to the problem of preparation for medical school—Why do we have medical schools? Perhaps, stated in a slightly different manner—What is the goal of a medical education? If we can answer this question then the problems of preparation for entrance to medical school should also be solvable.

I believe the goal of a medical education is to train the individual to be a physician to serve the health needs of the people.

You will note I have not included the training of medical specialists in either the basic medical sciences or the clinical medical areas, nor have I included the

development of medical research investigators, nor the training of a medical faculty. This is neither the time nor place for the discussion of these problems; but permit me to state in passing that the University Graduate School faculty is available for the education of basic medical scientists, and the research laboratories and foundations are equipped to develop medical research investigators while our teaching hospitals are responsible for the postgraduate medical training in accordance with the requirements of the medical specialty boards and colleges. From these several sources of postgraduate medical education should then come our future medical faculty members.

Assuming that for the development of my thesis you accept my basic proposition as to the goal of medical education, then let us turn to the preparation of the student who is to voluntarily select the career of a physician as his life work.

The student must have personal motivation to enter medicine, a devotion to study and learning, and a curiosity which will inspire personal investigation. His preparatory education must provide training to understand basic problems, for as a physician he must realize the limits of medical knowledge and strive to understand the methods and efforts required to expand these limits to the benefit of the patient. This sense of responsibility for the patient must be developed early, for associated with fundamental knowledge and experience it should be the basic characteristic of our physician. I do not believe preceptors, advisers or councilors are necessary, helpful, or required for our student during his medical education if our student is to have the prerequisite maturity of a physician and be intrusted with the care of patients upon graduation.

The academic preparation of our prospective student, therefore, should be centered upon disciplined self-development with broad interests rather than an early narrowing of his field to the areas of biology, chemistry, physics, and such subjects as psychology, genetics, statistics, and sociology.

It is true our prospective student needs a "working knowledge" of chemistry, physics, and biology but it is only fair to ask the question, "Why must the physician spend unlimited hours in lecture and laboratory work, first in high school, then in college, and again in medical school (and if he elects to specialize, then still further courses in the postgraduate specialty training) in the fields of chemistry, physics, and biology?" Why do premedical advisers urge college students to fill their curriculum with courses in physical chemistry, agricultural chemistry, physiological chemistry, etc.?

In my opinion, the students who elect medicine as a career are not so poor that they require all this multiplicity of science courses to obtain broad fundamentals. Nor do I believe our faculties are so inept in presentation that the student must be plagued year after year with a spiraling group of science courses so that he may enter medical school. Could it be that our science faculty is more interested in developing science students rather than prospective physicians? I am certain that as the clinical subjects in medical schools require more time for presentation and thus force their way into the available hours of the sophomore and even the freshman year, science for science sake will be limited in the medical curriculum with more emphasis on scientific "working knowledge" rather than specific scientific specialization.

I trust that in our American colleges, education in the areas of history, language, culture, philosophy, economics, politics, ethics, and religion will be available to the prospective medical student, but not as "required courses" for graduation. The only justification of a four-year college education for the preparation of medical studies I believe to be the development of a student capable of understanding community life and society in which he and his patients-to-be must live. Our European and English colleagues who go directly from preparatory school to the University for five and one-half years of medical training are our equals in the scientific approach to medicine. If your nationalistic provincialism has been

touched by such a remark, then ask yourself who it was that gave us the antibiotics, the sulfonamides, the roentgen and radiological therapy, the vitamins and several of the hormones. They were not products of our American educational system. Surprising what those medical men have done with a total of one year of physics and one year of chemistry as a "working knowledge of science" prior to entering the clinical years of their medical studies in their Universities. Still more surprising that the English and Northern European medical students have not been exposed to a system of designated advisers and councilors, or required courses, but have sought out advice as they have sought knowledge, by independent decision and action.

The advancement of medical knowledge and development of health facilities in this the atomic age permits one physician to care for more and more patients—but the physician must be an individual of broad interests, dedicated motivation and a continuing investigative urge if his patients are to receive the most modern treatment available.

Hours, days, weeks, and years spent with formulas, equations, complex reactions, dissections, and theories ad quantum are not, per se, the indicators of the knowledge we seek in the student of today, to be the physician of tomorrow. Rather, we hope to find a student willing to dedicate himself to a medical career because he is motivated to seek the best treatment for his patients of tomorrow.

Does this mean dropping from our so-called "premedical education" organic chemistry, physics, or embryology? Decidedly not, but it should mean the coordination of these basic sciences with a broad insight into the problems of total man and his environment, to be obtained by a proper balance in curriculum and extra-curricular activities.

To summarize my thoughts then as to the preparation for medical education, I should be so bold as to suggest the dropping of the term "premedical studies." Rather, I should hope our medical student would come to our medical faculty with his mind developed through college education that he may think; with his hands trained that he may apply the scientific and mechanical tools of the health sciences, and his heart dedicated to human understanding and sympathy for his fellow man. Such a student then, with these three attributes of his mind, his hands, and his heart, will be the practitioner of the "art of the practice of medicine" and will bring relief to his patients afflicted with mental and physical disease, pain, and suffering.

## PREPARATION FOR THE PRECLINICAL YEARS OF MEDICAL COLLEGE

RALPH W. STACY, Ph.D.

*Department of Physiology, The Ohio State University, Columbus 10*

The preclinical years of medicine are in general the first two years. During this time the student receives instruction in what are known as the "basic sciences" of medicine, including anatomy, biochemistry, physiology, pathology, and bacteriology, and related courses. These are the courses which contain information on the nature and function of the body parts and the whole body, and on the basic processes which occur in disease. It is on this information that all of the techniques and procedures of the following clinical years are based. These courses provide the foundation for the training of the physician, and if the foundation structure is found wanting, the physician will be found wanting.

There are several reasons why medicine of today is not, or should not be, the same as it was ten or twenty years ago. Chief among these are (1) that during

the past several decades, information about all bodily processes has been accumulating at a prodigious rate, resulting in the condition that nowadays there is never any question about what one can find to put into a course, but rather what can be thrown out with the least harm, and (2) the fact that other sciences are contributing greatly to the understanding of physiological and pathological processes. Inherent in this second reason for change is the natural evolution of any science. The sequence of development of a science runs (a) qualitative observations, (b) qualitative experimental observations, and (c) quantitative experimental observations. Medicine is just making the transition from (b) to (c).

These changes in the general nature of the field of medicine are the result of efforts of a large number of scientists, many of whom are the professors who teach the medical students. As a result, the staff of a medical college is usually well equipped to present the modern material to the students, but cannot do so because of the time requirements of the existing medical curriculum. There ensues from this unfortunate set of conditions a lag existing between technological developments and the application of such developments in medicine.

The lag so noted constitutes the major discrepancy in what should be and what actually is taught to medical students.

The technological developments concerned in this situation are in most cases those concerned with quantitative physical science. For example, in the first two years of the 1950's, research revealed the complete basic nature of the nerve impulse and its propagation. Unfortunately, this information is not being taught to the medical students because the entire explanation is based on a moderately complex mathematical analysis and our medical students are not capable of handling the mathematics involved.

In order to remedy this we must (a) teach the necessary mathematics in medical school, or (b) see that the students get the mathematics in premedical college. An examination of the problems concerned reveals that the medical student should have college algebra, trigonometry, and differential and integral calculus.

Now this plea for more mathematics is not the ravings of an heretic; it is simply a reaction to listening to countless groans which arise whenever one puts an equation on the blackboard. Such manifestations of failure to understand are discouraging to say the least.

Another and closely related need in the training of premedical students is more physics, and perhaps a different way of presenting physics. Part of this need arises from the recent rather tremendous surge in medical applications of physics and the development of biophysics as a separate discipline. Much of the need arises, however, because the physics presented in premedical college simply is not adequate.

The inadequacy of the present arrangement is at least in part because the premedical student does not get enough mathematics for thorough understanding of the principles of physics. In part, it also results because the teachers of physics make no attempt to show the student any reason for studying physics. "Physics for physics' sake" is the watchword in premedical courses.

Lastly, the timing of the physics courses is poor. Physics is generally given in the sophomore year of college, and it is three or more years before physics is referred to again. The forgetting curve takes its toll in this interim.

One can see another reason why physics has not been properly utilized in medicine if he examines the premedical curriculum comparatively. In chemistry, for example, the students get courses in inorganic chemistry, organic chemistry, qualitative and quantitative analysis, and in medical school, biochemistry. In all, a total of three years of courses are spent in getting adequate chemistry. In physics, on the contrary, the student gets only one year of somewhat diluted physics. Now physics is no less complicated than chemistry and so needs no less time for

its mastery; nor is it any less important than chemistry in understanding the phenomena of living matter. The conclusions are obvious: we are delinquent in teaching a major segment of premedical knowledge.

A third real need in the premedical curriculum is physical chemistry. Nowadays, we see studies of cancer, cirrhosis, blood dyscrasias, and many other clinical entities based on biophysical chemistry. Drug action, immunity, pathological processes, cell division, etc., all have physical chemical phenomena as their basis. How can the physician understand and use or treat these phenomena if he does not understand their background? He cannot!

These, then, are the needs. The medical student already carries twenty to twenty five hours of work, so that we cannot add these subjects to his medical curriculum without dropping out something else. Shall we drop out heart disease, or psychiatry, or polio, or obstetrics? Such a move would bring down the wrath of the whole medical profession on us, and would not endear us to the general public at all.

Suppose we examine the possibility of inserting these needed courses into the premedical curriculum. Again, examination shows that the premedical curriculum is full, and the arts and sciences people decry the lack of time for insertion of electives. But what are the subjects which so firmly pack the premedical schedule? One sees history, languages, social studies, philosophy, art, physical education, etc., which seem to have no immediate bearing on preparation for medicine. Can we eliminate some of these? Most medical school instructors agree that medical students are deficient in the use of the English language, and if we should recommend anything, we would recommend the addition of further training in grammar, sentence structure, and the art of expository writing.

Again, can we eliminate some of the less obviously valuable courses? "No," cries the arts administrator, "we must not drop anything that adds to the cultural development of this student." In fact, these administrators have gone so far as to say that they will not include any materials which may be construed as "preprofessional".

Now this attitude is not hard to understand, and one can even justify it if he looks from the proper direction. But which is more important or desirable, to have doctors who are technically deficient but highly cultured, or doctors who know their medicine but not their aesthetics?

This concept of the predominance of cultural subjects in college training is an extension of trends in grade and high school curricula. You all know that recently, educators have become aware that their past efforts have resulted in a sparsity of technical personnel, and now the pendulum is swinging back toward inclusion of technical subjects in the lower level schools. This must be done lest we strangle in our own intellectual blood for lack of nutrient technical training.

The physician's heritage is the knowledge of medicine. If acquisition of that knowledge requires changes in the premedical training, then we must make those changes. We must not deliberately be guilty of limitation of the ability of the physician trainee to understand his business. Such limitation would only be to our own detriment.

## THE CLINICIAN'S VIEW ON THE PREPARATION OF PREMEDICAL STUDENTS

JAY JACOBY, M.D.

*Department of Anesthesiology, The Ohio State University, Columbus 10*

When first asked to be a member of this panel, I was reluctant to assume the role of representing the clinician. One does not often think of the anesthesiologist as a representative of the field of clinical medicine. On second thought, however,

it does not seem entirely unreasonable. Anesthesiology is concerned with patients having all types of surgical procedures and who, in addition, may have all varieties of medical complications. We deal with sick patients who are emotionally disturbed, undergo surgical trauma, and receive toxic drugs.

Before deciding how to prepare a student for clinical medicine, let us consider what the physician does, for what the student is being prepared. In dealing with patients, the clinician must have patience and listen; he must evaluate the patients' complaints, which often are numerous and may have little bearing on the basic disease problem. The physical examination, laboratory reports, and x-ray may give valuable, or misleading, information. Having a mixture of facts, assumptions, and hunches, adding to this his general knowledge of human behavior, the physician must arrive at a tentative diagnosis and a course of action. The decision, of course, must be based on the knowledge of anatomy, physiology, pathology, and pharmacology. The diagnosis may be modified or changed as the course of the disease indicates, and the method of dealing with it may be modified or altered. At times manual dexterity may be required in order to carry out the course of action.

In what way can the pre-medical education contribute to the development of the physician? Certain traits are desirable, and certain knowledge is imperative if the physician is to be a capable practitioner. The medical school will provide the specific knowledge which the physician needs. The college should provide some basic knowledge, and foster the desirable characteristics. I will indicate some of them, attempt to point out why they are important, and perhaps what can be done by the college to develop them further.

1. *Interest in people.* The physician deals not with a disease, not with a germ, not with a pathological entity, but with a person who is troubled or sick. Many patients who seek the advice of a physician have no organic disturbance whatever. They may develop physical complaints based on emotional or psychologic disturbances; they are not psychotic. A large proportion of the work of the physician consists of listening to people and attempting to help them solve the problems of their life situation.

Even when organic disease is present, the psychological overlay, or the adjustment of the person to his disease, is a very important factor in the way he responds both to his disease and to his treatment. A patient may be cured of his physical illness, and go through life with a psychological or emotional disability.

For many patients, perhaps for most patients, the interest of the physician and his sympathy with their problems are of equal importance with the physical method of treatment. For this reason I believe that the pre-medical student should not only be interested in people but should learn more about them in his pre-medical courses by instruction in sociology, philosophy, psychology, history, and civics.

2. *Sense of responsibility.* Self-discipline and the sense of responsibility are primary attributes of a good physician. The physician is duty bound to keep his information up to date. When he encounters a problem with which he is not familiar, he must take the time, and make the effort, to learn what there is known of the subject before making a decision or giving advice to his patients. When the physician undertakes to provide medical care to a patient, he sometimes is faced with difficulties and time requirements far beyond what he had expected. The study, thought, and time required to care for the sick patient properly must be conscientiously provided.

The pre-medical student should be indoctrinated with the self-discipline and the feeling of responsibility to accomplish what is expected of him. In this regard I believe our pre-medical training is considerably lacking. In any college course a certain acquisition of knowledge is expected. We should not call the roll or in other ways compel the students to attend lectures. If the teacher is good, the



students will attend the lecture because of what they get out of it. If the teacher is not good, he should seek to improve himself rather than compel attendance by roll call. Having a sense of responsibility, the student will acquire the knowledge necessary to complete the course, whether it comes from lectures or individual study or both.

In keeping with this, I believe it might be well to give each student a project of considerable duration, with little supervision except that which the student requests. The completion of a project each semester would give the student practice in assuming responsibility, sustaining interest, and carrying through the necessary work.

3. *Method of thinking.* The method of thinking required for the successful practice of clinical medicine is somewhat different from that of the mathematician, the physicist, and the chemist. Medicine is not an exact science. On the contrary, sometimes, the so-called scientific part of medicine does not agree with the clinician's judgment; it is often wise to disregard the laboratory findings and to proceed on the basis of his opinions.

The type of reasoning which the physician must do is similar to that of the detective. Of all the minor abnormalities which every individual has, the physician must select and investigate the one or two which appear to be pertinent to the problem at hand. Of many dozens of possible laboratory studies, the physician must select a few which promise to have a bearing on the problem. He must pay attention to major factors in the overall picture, and yet must not ignore an apparently minor detail which may provide the clue for the solution of the problem.

How the pre-medical teacher can assist the student in acquiring this type of thinking process, I am not certain. Perhaps a course in logic might be of considerable value here. Perhaps problems in pre-medical classes might be deliberately complicated by the addition of much irrelevant material which the student will learn to recognize and eliminate. Thinking quickly is also important; the student should be stimulated to aim at rapid answers; place a premium on speed.

4. *Emphasis on function.* Function, not structure, is the concern of the physician. A knowledge of structure is important only in that it helps to understand function. I believe that the pre-medical courses place too much emphasis upon structural biological studies. In many respects these studies merely anticipate the subjects of the medical school. If any biological science at all is taught to the pre-medical student, it should probably be physiology, so the student becomes oriented to thinking in terms of function. Perhaps an integrated program of the biological sciences might be in order, using physiology as the focal point, with the other biological sciences included insofar as they contribute to an understanding of how the body works.

5. *Ability to communicate.* The ability to communicate with people is important for every physician. In this regard the pre-medical teaching program can do a great deal to improve the student who is sent on to the medical school. He should have a better working knowledge of the English language, both in speaking and writing; he should also have some training in public speaking.

As one of the intelligent and educated members of a community, the physician has the duty to take part in the activities of his town or city. He should also take part in his professional group's activities. Improvement of medical care is based not only on each physician's improving himself, but also on each helping to advance the knowledge or the skills of others. In both instances the ability to write well and to speak clearly is essential.

I have not commented on the need for the physician to be a scientist, to acquire a great deal of knowledge in the fields of mathematics, chemistry, physics. Extensive knowledge of these subjects is highly desirable. The pre-medical student, however, has only a certain amount of time in which to prepare himself for medical school. If his college course were eight years in length, many more subjects

could be added. Since only a four year period, sometimes less, is available for pre-medical training, the subjects should be selected and the time apportioned in such a way as to prepare the future physician for the assumption of his clinical responsibilities. The proportion of class hours devoted to the basic sciences might have to be curtailed. Would this seriously interfere with medical progress?

Some of the basic science courses merely anticipate what is taught in medical school, to make it easier for the student later. This should not be necessary. For the physician interested in the pursuit of a research project, deficiencies in knowledge in the basic sciences can be made up fairly rapidly by intense, motivated study, and by consultation with experts in the field. Of the information which he memorized in his basic science courses, only a smattering remains with the student when he enters the field of medical research five, six or more years after graduation from college.

To summarize, I believe the function of the pre-medical college is to foster the sense of responsibility and inculcate self-discipline in the student. The college should stimulate interest in people, and how they function in society. The student should learn to think of people as integrated functioning units of psychological, emotional, chemical and physical make-up. With the student prepared in this way, the medical school is better able to train good doctors.

## PROBLEMS OF THE PREMEDICAL COLLEGE ADVISOR

R. A. HEFNER, Ph.D.

*Department of Zoology, Miami University, Oxford, Ohio*

The hardy perennial problem of the premedical student, like the poor, the grasshopper, the plantain and the starling, is ever with us. Contrary to persistent belief in many quarters, our task is not of general elimination or extermination but a careful selection of fruitful seeds from the tares and the chaff by a laborious winnowing process. This selection is as ancient as the art of medicine. There is no record to indicate that the apprentices of Hippocrates or the students of Galen and Silvius had to demonstrate their proficiency in organic chemistry or be able to apply the laws of probability to a problem in heredity, but they doubtless faced other barriers to the promised land that were just as formidable.

There are no vague mysteries nor any secret abracadabras to the ritual that leads to acceptance into the medical school. Beyond a real desire for the study and practice of medicine the student needs only to demonstrate scholastic ability and achievement beyond the average academic level. How far beyond that level is a question that can best be answered in terms adjusted to the standards of his particular institution. The record in the sciences will come under particular scrutiny but the over-all scholastic standing is the basic consideration. There may be medical applicants who demonstrate achievements in English or Foreign Languages far beyond their ratings in science but such do not seem to attend our University.

If indoctrination and orientation, instead of selection, becomes a general policy for the initial year in Medical School, the task of premedical selection assumes a role which is even more significant in the future than it has been in the past. The net result of this selection must be a product which we can guarantee, physically, intellectually and morally. It would seem that the only guarantee that we may overlook is that of the ability of the student to finance a medical and post-doctoral program. That we have an effective system of selection in operation at Miami University is evidenced by the fact that but two out of 98 students admitted in the past seven years have failed to remain in the medical course.

At the beginning of his Sophomore year, our premedical student is assigned to an adviser (at present, these advisers are instructors in either Chemistry or Zoology). During the second semester of the Junior year, the student presents to his adviser the names of five instructors who will submit recommendations in his behalf. The adviser sends a formal recommendation blank to each of these five instructors with a request for completion and return by a given date. This blank is reproduced at the end of these remarks.

These five recommendations (we will act on a minimum of four) are summarized by the adviser and presented to a premedical committee which makes an over-all evaluation upon which the final recommendation is based. Our designations in this summary evaluation follow:

without reservation_____	fair	_____
strong	doubtful	_____
well	not recommended	_____

This evaluation is put in the form of a letter which goes out to the Medical Schools and presents a comparative evaluation of scholastic achievement, personality, character, ACE scores and extra-curricular activities. We feel that the final rating on all these bases is not only a mark of present accomplishment but a fair estimate of probable success in medical school. An example of the letter form follows:

MIAMI UNIVERSITY  
OXFORD, OHIO

COLLEGE OF ARTS AND SCIENCE  
122 Upham Hall  
WILLIAM E. ALDERMAN, *Dean*  
JAMES H. ST. JOHN, *Assistant Dean*

Gentlemen:

The following information concerning\_\_\_\_\_is furnished you by our Committee on Qualifications of Students for Medicine. This recommendation is based on information supplied to us by various instructors, using a form similar to this letter.

We have the following test scores for this student. Test scores are percentile ratings on national norms.

A.C.E. Intelligence: Quantitative\_\_\_\_\_Linguistic\_\_\_\_\_Total\_\_\_\_\_

Activities indicating leadership and social interests are listed below:

On the basis of the above information, from reports of instructors, from his scholastic achievement, and from personal acquaintance with the candidate, the Committee as a whole makes the following recommendation:

The committee considers that this recommendation should be regarded as:

without reservation_____	fair	_____
strong	doubtful	_____
well	not recommended	_____

It is recommended that this recommendation take the place of letters from individual instructors. If these are desired in addition, please notify us.

Sincerely yours,

\_\_\_\_\_  
For the Committee

The foregoing committee recommendation was based on the following information supplied by these instructors:

How well does he work? (especially in laboratory)

efficiently		adequately		inefficiently
speedily		average		ploddingly
thoroughly		adequately		superficially
complete independence	minimum help	average	quite dependent	completely dependent
neatly		average		sloppily

Scholastic interest:

With respect to originality:

highly original	somewhat original	lacks originality	no originality
-----------------	-------------------	-------------------	----------------

With respect to initiative:

strong initiative	needs starting push	considerable leading needed	complete follower
-------------------	---------------------	-----------------------------	-------------------

How well does he reason?

clearly and concisely	arrives deviously but can usually be led	hazy	often does not follow	cannot reason
-----------------------	--	------	-----------------------	---------------

Reading within science area:

broad background	keeps up	minimum amount
------------------	----------	----------------

Reading in other areas:

broad	average	narrow
-------	---------	--------

Personality and appearance:

He gets along with his fellows:

minimum friction	average	much friction
------------------	---------	---------------

He is:

quiet	average	lively
reserved	average	forthright
fully cooperative	average	uncooperative

His emotional balance:

apathetic, unresponsive	often fails to respond	well-balanced	occasional emotional outbursts	over-emotional
-------------------------	------------------------	---------------	--------------------------------	----------------

Professionally, his appearance would:

favor him	be average	hinder him
-----------	------------	------------

He is:

over meticulous	neat	average	untidy	sloppy
-----------------	------	---------	--------	--------

Comment on qualities of leadership:

Culture, background, good taste, good manners:

He is thoroughly trustworthy:

Instances of dishonesty:

In what respect does he impress you most favorably?

In what respect does he impress you least favorably?

Estimate of success in medical school:

How good a physician will he be?

How should he be recommended by Miami?

without reservation	strong	well	fair	doubtful	not recommended
---------------------	--------	------	------	----------	-----------------

## SUMMARY OF COMMENTS MADE IN OPEN DISCUSSION

(Editor's note: After the formal presentation of the foregoing papers, the meeting was thrown open to discussion from the floor. This discussion was lively, and was carried on by a number of people from the audience in addition to the formal participants. The comments were tape recorded, but were so lengthy as to preclude publishing in their entirety. Therefore, we have attempted to abstract the major ideas from the recording. There is no attempt to identify the commentators or to present these ideas in the same chronological order in which they appeared. Please accept our apology for misquotes or deletions, all of which are entirely unintentional.)—RWS.

Early in the period of open discussion, one of the major problems of premedical education was laid bare. This is that there is often a discrepancy between what the medical college catalog lists as required of the student and what the student actually needs when he gets into medical college. It would appear that this problem is widespread, and has occupied a major portion of the attention of several large meetings (e.g., recent meetings on premedical education in Chicago).

In later remarks, it was pointed out that the nature and extent of catalog material per se has been the subject of national meetings of medical educators and that the consensus of opinion is that the catalog material should represent only a guidepost of minima for premedical preparation. Thus, the premedical adviser and his prospective medical student should use the medical college catalog only as a skeleton structure, and should build his general preparation around this structure.

A later comment from the floor pointed out that in many cases, the medical college admissions boards take the requirements they put into the catalogs as absolute. For example, a situation was described where two students had received all the preparation they needed, but because of difficulties in scheduling could not obtain the last semester of the laboratory of organic chemistry. These students were accepted for medical school only on condition that they acquire this last bit of academic work. The commentator felt that the extra time and effort and expense involved on the part of the students was out of proportion to the benefit they would derive from finishing the course. He then pointed out that there existed a disagreement between what the medical college administrators say is their policy and what they actually put into practice.

One of the major points of discussion arising in this meeting was concerned with the difference in outlook of the clinician and the preclinical scientist. It was stated that one cannot hope to understand and treat the human body without first obtaining a knowledge of the structure and function of the body. It is likely that the lag which exists between discovery of fundamental phenomena and their application in medicine is largely due to failure to understand the principles underlying the discovery.

The basic scientist (*i.e.*, the preclinical professor) was referred to in partial jest as a "sadist" who wanted to make it as tough as possible on the student. Certainly this term would apply to only a few such individuals. An anatomist in the audience emphasized his frequent disappointment at the student's lack of basic preparation, but pointed out that perhaps this was because the basic science professor thinks of the kind of student he would *like* to teach rather than the physician which he is charged to train.

It was then stated that the physics and mathematics which were recommended additions (see formal presentations) were actually quite elementary in scope, and the proponents did not want to make mathematicians or physicists out of the students at all. An example was given of an instance where graduate physicians were using an important technique for therapy on the basis of physical principles which did not apply to the system with which they were working. It was suggested that the physician we are now training may be deficient in important information without knowing it.

The clinician, on the other hand, is more interested in how the student purports

himself in the clinic and hospital than in how much detailed scientific information he has acquired. Indeed, in this respect the clinician sometimes disagrees with the medical college administration. It was pointed out that the trainee under discussion is *not* the ultimate medical researcher, for such men are unique and can obtain the special training needed independently. Some of those present disagreed with this general concept, and expressed the feeling that research was important to the practicing physician as well as the clinic or hospital physician.

It was reemphasized that if there were not disagreement about these problems, there would be no reason for having such a meeting as this. One commentator who is himself a clinician stated that students do indeed need to know the basic science of their profession, but perhaps even more important is that he must learn to assume responsibility and he must like and take an interest in his patient. This question of instilling into the medical student the attributes of responsibility and love of the human race was discussed at considerable length. It would appear that the real question is whether it is possible to teach these esoteric qualities as such, and whether such qualities would not be useless without sufficient technical training.

At various times during the discussion, the question of evaluation of student performance was raised. From the premedical advisers' point of view, evaluation was in terms of the percentage of their students who were accepted to medical school, and occasionally in terms of the number of such students who completed medical school successfully.

The medical college administrator, on the other hand, evaluates his students on the basis of success in getting the students placed in internships and residencies of their choice. Also, it was pointed out that the major criterion of success in training physicians is the fate of the physician after he has been out of medical school for several years. It was felt that if the community (here it was emphasized that this applies especially in small communities in the absence of large well equipped and staffed clinics) trusts and depends on the physician, then that physician must have been well trained. This implies, of course, that the general public is intelligently critical, which the commentator believes is so.

A problem which occasionally arises from relations between the premedical advisers and the medical college was cited. As an example, the commentator described a case in which a student was highly recommended by his premedical college but was found at interview to have a police record. The admissions committee in this case was hard put to arrive at a decision on this student because his premedical advisers insisted he was completely rehabilitated. Still, the acceptance of a student with any question of social irresponsibility is a grave and serious matter. The point of these comments was the restatement of the tremendous responsibility of the admissions committee and the fact that the committee often is faced with problems which are very difficult of solution.

One commentator neatly stated his position with respect to the general aims of the premedical college. He felt that students who had majored in sociology or history or languages could acquire the scientific background they needed in a few courses and would make just as good physicians as those who had spent the majority of their time in technical background training. Obviously, there were persons present who disagreed with this point of view, and others who agreed with it.

This, then, is the gist of the ideas presented in open discussion. At the end of the meeting, one fact had become increasingly apparent: there is a need for more such meetings.